

## Claims

- [1] A garbage collection method comprising:  
making a list of objects that must be deleted from a memory;  
calculating a residual time up to a predetermined time limit after processing an external command;  
deleting the listed objects from the memory during the residual time; and  
storing a list of remaining objects that have not been deleted from the memory during the residual time.
- [2] The method of claim 1, wherein the calculating the residual time comprises:  
calculating a residual time remaining up to a timeout limit determined by a host that transmits the external command or up to a time guaranteeing QoS that a user does not feel a response delay to the external command.
- [3] The method of claim 1, wherein the making the list of objects comprises:  
making the list when garbage collection is requested or when a communication session for receiving the external command is initialized.
- [4] The method of claim 1, wherein the making the list of objects comprises:  
if objects that have not been deleted before exist in the memory, adding the objects to the list of objects.
- [5] The method of claim 1, wherein the making the list of the objects comprises:  
if an object is newly generated or deleted during the command processing  
updating the list of objects to be deleted.
- [6] The method of claim 1, wherein the deleting the listed objects comprises:  
if there is the residual time after the listed objects are deleted, making a new list of objects to be deleted from the memory.
- [7] The method of claim 1, further comprising:  
if there is an existing list of objects to be deleted before the list of objects to be deleted is made, deleting the objects from the memory before the external command is processed.
- [8] The method of claim 1, further comprising:  
if the command includes a memory write command or an object delete command, and if there is a list of objects to be deleted from the memory before the write or delete command is processed, concurrently performing the deleting of the objects and the write or delete command.
- [9] The method of claim 1, wherein the deleting the listed objects comprises:

if the objects to be deleted consecutively exist in the memory, simultaneously deleting the consecutively existing objects, and if memory space to be allocated for an object and memory space of the objects to be deleted are consecutive memory spaces or the same memory space, concurrently performing the allocating and the deleting.

- [10] A garbage collection apparatus comprising:  
a timer, which calculates a residual time up to a predetermined time limit after processing an external command; and  
a memory management unit, which makes a list of objects that must be deleted from a memory, deletes the listed objects from the memory during the residual time, and stores a list of remaining objects that have not been deleted from the memory during the residual time.
- [11] The apparatus of claim 10, wherein the memory management unit, if there is an existing list of objects to be deleted before the list of objects to be deleted is made, deleting the objects from the memory before the external command is processed.
- [12] The apparatus of claim 10, wherein the memory management unit, if the command includes a memory write command or an object delete command, and if there is a list of objects to be deleted from the memory before the write or delete command is processed, concurrently performing the deletion of the objects and the write or delete command.
- [13] A computer readable medium having recorded thereon a computer readable program for performing a garbage collection method comprising:  
making a list of objects that must be deleted from a memory;  
calculating a residual time up to a predetermined time limit after processing an external command;  
deleting the listed objects from the memory during the residual time; and  
storing a list of remaining objects that have not been deleted from the memory during the residual time.